

**A new record of *Cornechiniscus madagascariensis* Maucci, 1993
(Tardigrada: Echiniscidae) from India**

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Abstract.—*Cornechiniscus madagascariensis* Maucci, 1993 which has been known only from its type locality, Madagascar, is reported from Himachal Pradesh, northern India. Some taxonomic emendations to the original description are made from the paratypes.

Recently, through the courtesy of Dr. H. Dastych of the Zoologisches Institut und Zoologisches Museum der Universität Hamburg, we had an opportunity to examine an unidentified *Cornechiniscus* species collected from Himachal Pradesh, northern India. After the direct comparison with the paratypes of *C. madagascariensis* Maucci, 1993 deposited in the Museo Civico di Storia Naturale di Verona, it was concluded that the specimen from India should be identified with *C. madagascariensis* which has previously been known only from its type locality, Madagascar. In this paper, we describe this species in detail based on the specimen from India, and make some taxonomic emendations from the paratypes.

The specimens mounted on the microslides were closely examined by a phase and Nomarski differential interference contrast microscope (Zeiss Axiophot) at maximum magnification ($\times 2500$), illustrated with the aid of camera lucida, and measured using an eyepiece micrometer.

Terminology is mainly that used in Abe et al. (1998). Abbreviations used in the text are as follows, CT: Museo Civico di Storia Naturale di Verona (Italy), ZMH: Zoologisches Institut und Zoologisches Museum der Universität Hamburg (Germany).

Genus *Cornechiniscus* Maucci &
Ramazzotti, 1981

Diagnosis.—Echiniscidae with horn-shaped cirrus A. Granulation on body surface consists of cuticular swellings. Pseudosegmental plate present. Secondary clava hemispherical. Venter with longitudinal cuticular grooves.

Type species.—*Echiniscus cornutus* Richters, 1907

Cornechiniscus madagascariensis Maucci,
1993

Figs. 1, 2, 3A–E

Cornechiniscus madagascariensis Maucci,
1993:383, figs. 1–4.—Antananarivo,
Madagascar.

Material examined.—Paratypes: two adult females, Madagascar “Antsirabe, 8/v/1989, *Cornechiniscus lobatus madagascariensis* Maucci, paratipo, 19/v” mounted in polyvinyl-lactophenol (CT 13915, 13918). One adult female, India “Himal [sic Himachal] Pradesh, 1500 m asl., moss from rocks, Sep 1976, lg. J. Błoszyk, (T. 4), *Cornechiniscus*” (ZMH).

Comparative material.—*Cornechiniscus lobatus* (Ramazzotti, 1943): syntypes: Italy “I-44, *Pseudechiniscus cornutus* f. *lobata*, Montirone (Abano), 12-5-42, G. Ramazzotti, 1 Muta con 2 uova, 6 [sic 7] Individui,

forma *lobata*, (Muschi su roccia), -solo Faure-, 24, TIPO, *P. cornutus* f. *lobata*" (CT).

Female from India.—Body length 295.0 μm excluding leg IV, width 136.0 μm ; body width : body length, 1:2.17. Eyespot well-marked, black, subelliptical, 9.7 μm wide, situated in posterior part of head plate. Body color evenly translucent in preserved material.

Dorsal plates thick. Dorsal surface including intersegmental lateral plates wholly covered with fairly coarse granulation that consists of pillar-shaped cuticular granules; adjacent granules distantly spaced, interconnected with conspicuous cuticular striae; granules near edge of each plate much smaller than those at median part; granules on scapular, segmental paired, median, intersegmental lateral (1 and 2), pseudosegmental, and terminal plates ca. 2.5 μm in diameter; granules on head plate and anterior part of neck plate ca. 1.5 μm in diameter; granules on posterior part of neck plate ca. 0.2 μm in diameter. Lateral region of neck plate and basis for cirrus A only with very fine, densely distributed punctations that consist of pillar structures of epicuticle.

Head plate well-developed, with two zigzag-sutures, showing faceted appearance.

Neck plate conspicuous, subdivided vertically into three parts; posterior part of neck plate developed as a lobe which is narrowly overlapping anteriormost part of scapular plate.

Scapular plate well-developed, anterior with poorly defined W-shaped sculpture; posterior to W-shaped sculpture, scapular plate shallowly subdivided vertically at middorsal line of body; an oblique cuticular line at each lateral side.

Median plate 1 clearly subdivided into anterior and posterior parts; anterior part fairly larger than posterior part; anterior and posterior parts trapezoidal and inverted subtriangular in shape, respectively.

Intersegmental lateral plates 1 and 2 similar to each other in size and shape.

Segmental paired plates II and III well developed, similar to each other in size and shape, both with lateral segmental plates; small, triangular spines developed posterior part of lateral segmental plates II and III each (spines C and D).

Median plate 2 clearly subdivided into anterior and posterior parts; anterior part subpentagonal, fairly larger than posterior part; posterior edge of posterior part sinuate.

Median plate 3 well-developed, rhomboidal, undivided.

Pseudosegmental plate clearly subdivided vertically at middorsal line of body; lobe on its posterior margin well-developed, unpaired, but shallowly bilobate, 11.4 μm high, 33 μm wide at base; tips of lobe smooth, without spine.

Terminal plate with obvious, long incision which is slightly effaced near middorsal line of body; minuscule, triangular spine developed posteriormost of incision (spine E).

Leg plates developed on outer surfaces of legs I–III and dorsal surface of leg IV; each leg plate with coarse granulation similar to those on dorsal plates, i.e. adjacent granules interconnected with cuticular striae; granules larger but sparse on median part of leg plate, smaller but dense on peripheral part. Plate of leg IV without true dentate collar, but with very blunt triangular process posterior to leg plate. Sensory organ on leg I conical, 6.3 μm long, 1.7 μm wide at base; sensory organ on leg IV papillate, 6.9 μm long, 5.1 μm wide at base.

Dense patches of cuticular granulation situated below mouth opening, between each pair of legs I–III, and around gonopore; these patches each without perceptible edge. Venter longitudinally costate, with some shallow, linear grooves that developed from cuticular patch between leg I to gonopore, along with midline of body.

Mouth opening and cephalic sensory organs situated ventrally. Internal cirrus onion-shaped, tapering sharply toward tip, 8.6 μm long, 5.1 μm wide at base; external cir-

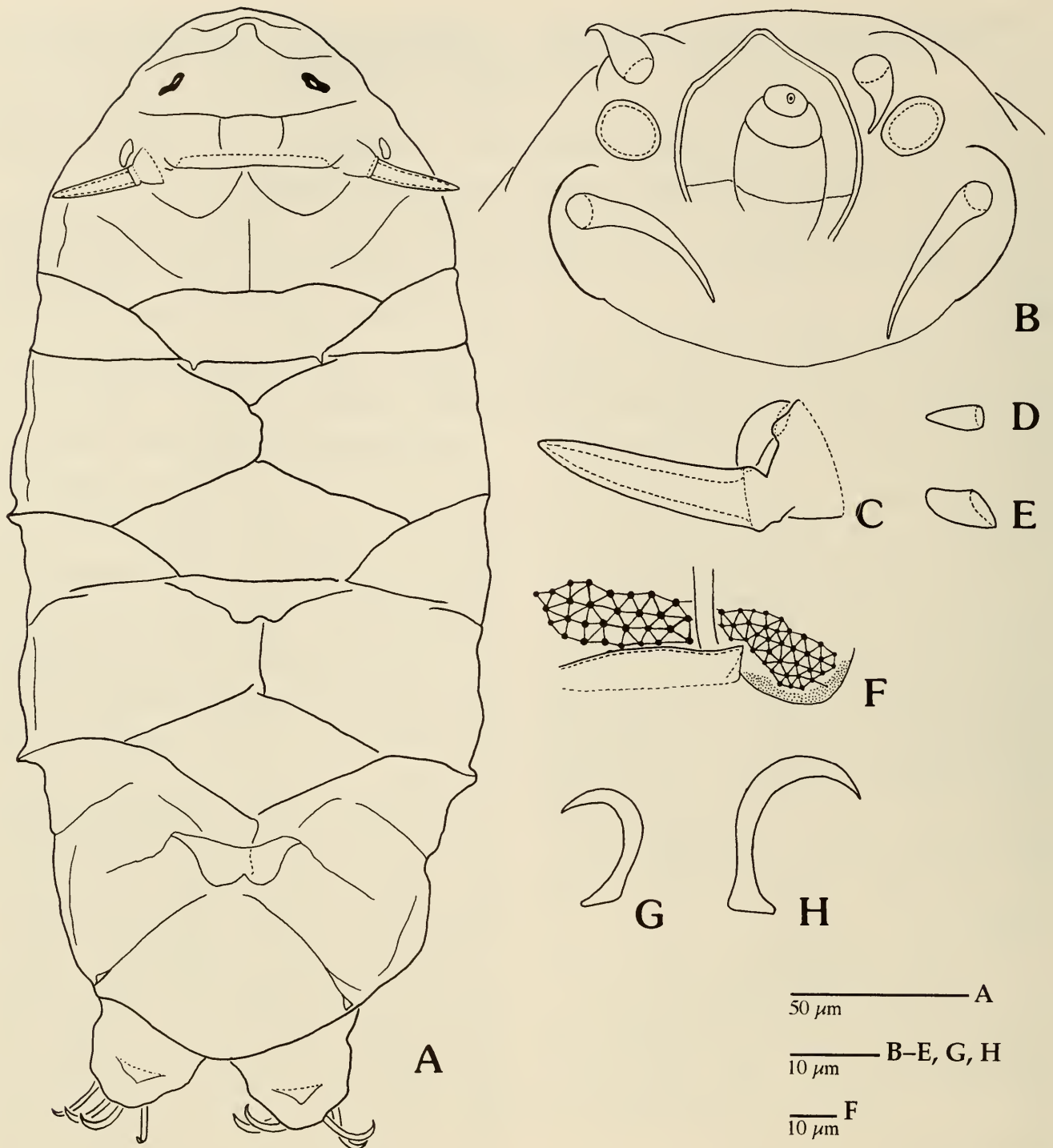


Fig. 1. *Cornechiniscus madagascariensis* Maucci, 1993. A, habitus, dorsal view; B, cephalic region, ventral view; C, cirrus A and primary clava on the left, dorsal view; D, sensory organ I; E, sensory organ IV; F, left side of segmental paired plate III and pseudosegmental plate; G, external claw of leg I; H, internal claw of leg IV. (A–E, G, H: ZMH; adult female; Himachal Pradesh, N India. F: CT 13918; paratype adult female; Antsirabe, Madagascar).

rus stout, tapering gradually, $21.4\ \mu\text{m}$ long, $4.0\ \mu\text{m}$ wide at base; both internal and external cirri without true cirrophores, but their proximal portions swollen in appearance; furthermore, internal and external cirri each with hemispherical cuticular swelling beneath own base; both sides of cutic-

ular swellings of external cirri interconnect each other with arcuate cuticular line. Secondary clava hemispherical, $7.4\ \mu\text{m}$ in diameter, situated nearer to internal cirrus than to external cirrus.

Cirrus A clearly longer than external cirrus, $28.6\ \mu\text{m}$ long, 9.7% of body length, 6.9



Fig. 2. *Cornechiniscus madagascariensis* Maucci, 1993. Habitus, dorsal view. (ZMH; adult female; Himachal Pradesh, N India). Differential interference contrast. Scale = 50 μm .

μm wide at base, directed laterad; cirrus A provided with normally developed cirrophore; primary clava situated just behind cirrophore of cirrus A, clavate, curved, apex directed posteriad, 8.0 μm long, 4.8 μm in diameter at base.

Claws I–III distally curved, whereas claw IV less curved compared with claws I–III; all claws thickened basally, without spur; internal claw slightly longer than external claw on all legs; claws I–III 12.8–14.3 μm long; claw IV clearly longer than claws I–III, ca. 18 μm long.

Female gonopore normal, consists of rosette-like structure, 16 μm in diameter. Anus large, situated posteriad, near base of legs IV.

Emendatory notes on the paratypes.—Body 282.1 and 322.4 μm long. Neck plate tripartite vertically. Scapular plate ornamented with ill-defined W-shaped sculpture. Cuticular grooves on venter well-marked. Small spines developed at positions C, D, and E. Other characters in concordance with Maucci (1993).

Remarks.—We examined two paratypes (lengths 295.0 and 322.4 μm) of *C. madagascariensis*. The specimen from India is almost identical with the paratypes including the following important characters: pattern of the dorsal granulation, shape and size of each claw, morphology of the cephalic and leg sensory organs. Although we were able to examine only one specimen from India, there seems to be no problem for us to identify the specimen with *C. madagascariensis*.

Maucci (1993) considered that *C. madagascariensis* is most closely related to *C. lobatus* Ramazzotti, 1943, and we agree with him on this point. He pointed out that the consistent absence of the dorsal and lateral body spines is one of the most important characters to distinguish *C. madagascariensis* from *C. lobatus*. We confirmed, however, that, as in *C. lobatus*, the small spines are actually present at positions C, D, and E also in *C. madagascariensis* (both in the paratypes and specimen from India).

There are some reports of *C. lobatus* provided with cuticular striae among dorsal granules, viz. Binda & Pilato (1972) from Sicily (Italy), Dastych (1979) from Afghanistan, and Moon & Kim (1991) from South Korea. Furthermore, we have verified recently that the cuticular striae are rather conspicuous, especially in the terminal plate, in the syntypes of *C. lobatus* (Fig. 3F). The cuticular striae were not mentioned in the original description (Ramazzotti, 1943) and subsequent redescription (Maucci, 1979).

From the evidence discussed above, the presence or absence of body spines and cuticular striae among granules cannot be used as taxonomic characters in discrimi-

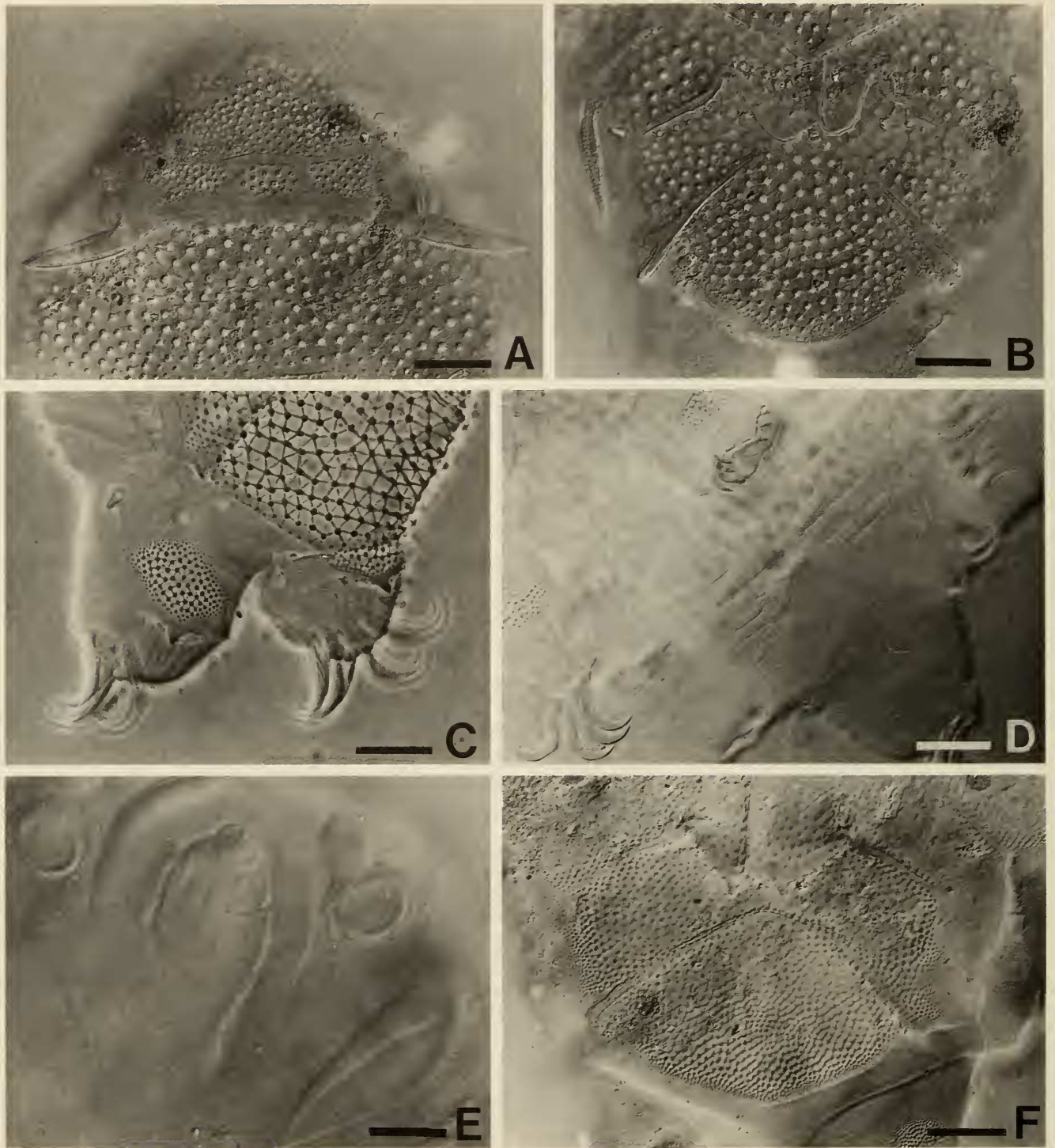


Fig. 3. A–E: *Cornechiniscus madagascariensis* Maucci, 1993. A, anterior body, dorsal view; B, pseudo-segmental and terminal plates, dorsal view; C, posterior body, dorsal view; D, venter between legs I to III, showing cuticular grooves; E, mouth and cephalic sensory organs. (A, B, E: ZMH; adult female; Himachal Pradesh, N India. C, D: CT 13918; paratype adult female; Antsirabe, Madagascar). F: *C. lobatus* (Ramazzotti, 1943), pseudo-segmental and terminal plates, dorsal view (CT; a syntype adult female). A, B, D–F: differential interference contrast; C: phase contrast. Scales = 20 μm (A–D, F), 8 μm (E).

nating *C. madagascariensis* from *C. lobatus*.

In *C. madagascariensis*, however, granulation on body surface consists of fairly large, distantly spaced granules (Fig. 3A–C), and this can be considered as the most

important criterion to distinguish *C. madagascariensis* from *C. lobatus* (Fig. 3F).

Discussion

In the original description of *C. madagascariensis*, Maucci (1993) implied that

this species may be referred to a subspecies of a cosmopolitan species, *C. lobatus* Ramazzotti, 1943. This also can be inferred from his specimen labels on microslides (see Material examined). Considering the present record from India which is quite far from Madagascar, however, the subspecific status cannot be supported. We are in agreement with Maucci (1993) who recognized *C. madagascariensis* as a good species based on the differences mainly discussed above.

We have confirmed that the ventral cuticular grooves, which have been omitted from the previous descriptions, are also commonly developed in many other *Cornechiniscus* species (unpublished data). In *Pseudechiniscus*, which is a closely related genus to *Cornechiniscus*, the venter is ornamented with net-like pattern in many species (Dastych 1984, Kendall-Fite & Nelson 1996). It is thus mentioned at present that the longitudinal groove character-condition is unique for the genus *Cornechiniscus*.

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